

The Allocation of Medical School Spaces in Canada by Province and Territory: The Need for Evidence-Based Health Workforce Policy

Attribution des places dans les facultés de médecine au Canada selon la province ou le territoire : pour une politique de la main-d'œuvre de la santé fondée sur les données probantes



LAWRENCE GRIERSON, PHD

*Associate Professor, Department of Family Medicine
McMaster University*

Scientist

*McMaster Education Research, Innovation and Theory
Hamilton, ON*

MEREDITH VANSTONE, PHD

*Associate Professor Department of Family Medicine
McMaster University*

Adjunct Scientist

*McMaster Education Research, Innovation and Theory
Member, Centre for Health Economics and Policy Analysis
McMaster University
Hamilton, ON*

Abstract

Background: Most Canadian medical schools allocate admission based on province or territory of residence. This may result in inequities in access to medical school, disadvantaging highly qualified students from particular provinces.

Method: The number of medical school spaces available to applicants from each province and territory was compared to the total number of available spaces in Canada, the regional application pressure and enrolment in 2017/2018.

Results: There is differential access to medical schools based on the absolute numbers of available spaces and application pressure. Applicants from Prince Edward Island are afforded the greatest number of spaces per 100,000 population aged 20 to 29 (5,568.8). Applicants from Ontario experience the lowest ratio of available spaces to relevant population (54.3).

Discussion: Health workforce policy must balance equity and regional social accountability. Privileging regional residence over academic aptitude and personal characteristics may be justified by strong evidence that these applicants are likely to serve populations that would otherwise be underserved.

Conclusion: The availability of medical school spaces in Canada differs as a function of the province or territory from which applicants apply. Determining whether this differential is justified requires appraisal of the consequences of the policies with respect to their goals.

Résumé

Contexte : Au Canada, la plupart des facultés de médecine prennent les décisions d'admission en fonction de la province ou du territoire de résidence des candidats. Cela peut entraîner des inégalités dans l'accès aux facultés de médecine, désavantageant ainsi les étudiants hautement qualifiés de certaines provinces.

Méthode : Le nombre de places disponibles dans les facultés de médecine pour les candidats de chaque province et territoire a été comparé au nombre total de places disponibles au Canada, à la pression de la demande régionale et aux inscriptions de 2017-2018.

Résultats : Il existe un accès différentiel aux facultés de médecine en fonction du nombre absolu de places disponibles et de la pression des candidatures. Les candidats de l'Île-du-Prince-Édouard bénéficient du plus grand nombre de places pour 100 000 habitants âgés de 20 à 29 ans (5 568,8). Les candidats de l'Ontario ont le plus faible ratio de places disponibles par rapport à la population pertinente (54,3).

Discussion : La politique de la main-d'œuvre de la santé doit concilier équité et responsabilité sociale régionale. Privilégier le lieu de résidence plutôt que l'aptitude scolaire et les caractéristiques personnelles peut être justifié par de solides données qui démontrent que ces candidats sont plus susceptibles de desservir des populations qui seraient autrement mal desservies.

Conclusion : La disponibilité des places dans les facultés de médecine au Canada diffère en fonction de la province ou du territoire à partir duquel les candidats postulent. Pour déterminer si ce critère est justifié, il faut évaluer les conséquences des politiques par rapport à leurs objectifs.

Introduction

The availability of medical school spaces in Canada is determined according to health workforce policies that, among other purposes, aim to ensure that there is a sufficient physician workforce to meet the healthcare needs of the population (Birch 2002; Herbert 2007; Institute of Medicine of the National Academies 2005). Regardless of increases in the number of spaces, there have long been more applicants for medical school than opportunities to enrol (AFMC 2018), and medical schools have developed and implemented individual

policies to assist in the allocation of admission spaces to prospective candidates they deem the most qualified. The most recognizable and scrutinized of these applicant selection policies are those that aim to differentiate candidates according to their cognitive abilities and interpersonal skills – qualities many consider the most important for being a physician (Siu and Reiter 2009). Increasingly, medical schools are also using social accountability policies designed to offset much of the inequity inherent to merit-based selection practices (Boelen 2011; Chapman and Jagsi 2017; De Freitas et al. 2019; Razack et al. 2015). Among these are a considerably less-publicized set of policies that involve the selection of physician trainees on the basis of their regional residence. For example, Memorial University (Newfoundland [NFLD]) holds 60 of 80 available spaces for residents of NFLD and Labrador (Memorial University 2019).

Policies of admission on the basis of residence are designed to meet obligations of regional accountability, founded upon an assumption that the social attachments that applicants have to their place of residence will promote the graduation of physicians who will choose to practise in those regions (Dahl and Sorenson 2010; Ellaway et al. 2018). The Northern Ontario School of Medicine (Ontario [ON]), for instance, has succeeded in increasing the number of physicians serving rural, francophone and Indigenous communities by selecting applicants from these communities (Strasser et al. 2009). Yet, it is important to be mindful that every set of policies has both intended and unintended consequences, some of which are potentially undesirable. In the case of policies that allocate medical school spaces by region of applicant residence, one consequence is that applicants across the country are not afforded equitable access to the opportunity to enrol in medical school. This, in turn, may mean that less-qualified applicants from the one region may gain admission into medical school, while more-qualified applicants from other regions are excluded.

The origin of regional allocation policies is opaque and idiosyncratic, decided at individual medical schools and in negotiation with the provincial government. The results of these negotiations determine a medical school's ability to open new seats, and provincial governments have used this policy as a lever to enact geographical policies pertaining to the allocation of medical school spaces for residents from particular provinces (Government of Nova Scotia 2019) and the establishment of regional campuses in areas with physician shortages (Hill 2016). However, individual medical schools have significant autonomy in how they decide to select students and allocate existing spaces, and there are numerous competing priorities, including increasing the representation of Indigenous, rural, francophone and Black students. The accreditation standards for admissions put forth by the Committee on Accreditation of Canadian Medical Schools stand as the main policy lever for a pan-Canadian strategy, yet, to date, they do not explicitly address geographical allocation. However, these standards do indicate that medical schools have a social accountability to admit applicants who will “address the priority health concerns of the populations [the medical school] has a responsibility to serve” (CACMS 2019). The medical schools have significant discretion in interpreting this directive and creating a strategy to fulfill this requirement (Hanson et al. 2016).

In this study, we appraise medical school admission policies and describe the distribution of available medical school spaces across Canada by province and territory. Our purpose in doing this is to determine whether current regional medical admission policies constrain equitable access to medical school for applicants across the country. The distribution of available spaces is also considered alongside data pertaining to regional application pressure (i.e., the number of applications generated from applicants within a province or territory), regional medical school enrolment success and regional physician-to-population ratios. Together, this descriptive policy analysis offers insight into the impact regional selection policies may have on the selection and graduation of aspiring physicians from across Canada.

Method

In this descriptive policy analysis, publicly available policies concerning the regional allocation of medical school spaces for the 2018 admissions cycle were collated in order to determine the total number of spaces afforded to applicants from each province and territory in that admission cycle. This included a concurrent review of the policies and statistics listed in the 2017 Association of Faculties of Medicine of Canada (AFMC) Canadian Medical Education Statistics (CMES) report (AFMC 2018: 3, Table 2b) and the admissions websites of each of Canada's 17 medical schools. Our primary interest was in determining the total potential opportunities to gain access to a medical school for applicants from each of the provinces and territories.

We began by determining the number of medical school spaces that were specifically "allocated" to applicants from each province and territory. This involved considering the potential availability of any one medical school space from the perspective of an individual making an application from any particular province or territory. We identified whether or not that seat was allocated based on provincial or territorial residence (i.e., X spaces to be held only by students from a particular region[s]). Determining the allocation of a space was straightforward for medical schools reserving spaces for applicants from the province in which the university is located. In some cases, however, we noted that the potential availability of allocated spaces is shared by applicants from different provinces or territories. For instance, Dalhousie University (Nova Scotia [NS]) reserved 99 of its medical school spaces for applicants from the Maritimes. Accordingly, these 99 spaces were included independently in the counts for Prince Edward Island (PEI), NS and New Brunswick (NB).

Notably, we recognized numerous policies that allocated spaces specifically for individuals with particular characteristics. These comprised spaces dedicated to Indigenous and francophone applicants, those that reside in rural regions, members of the Canadian Armed Forces, international medical graduate and visa students and applicants with interest in oral and maxillofacial surgery, dentistry or concurrent MD and PhD studies. We deemed these "special allocations" and considered them only when they impacted the total number of potential spaces available to applicants who did not meet the criteria for these spaces. That is, when these special allocations were presented alongside policies that created regional

application groups larger than the special allocation, we reasoned that they would not necessarily impede the total potential opportunity for individuals from either the sanctioned or unsanctioned region. For example, the University of Alberta (Alberta [AB]) maintained a regional admission policy that dedicated 85% or 138 of its 162 spaces to residents of AB. This meant that there were up to 24 spaces available for applicants from a province or territory other than AB. The institution also maintained an admission policy that described five spaces for Indigenous applicants and 10 spaces for individuals whose permanent residence is deemed rural. Because it is possible for all of these special allocations to be subsumed as part of either of the regional allocation groups (i.e., Indigenous and rural applicants may be from any province), these 15 spaces were not removed from the count of total potential spaces appropriated to residents from AB or those from outside AB. However, if special allocations were not presented alongside regional allocations, then we recognized them as limiting total potential opportunity for some applicants. For instance, the Northern Ontario School of Medicine (ON) dedicated two spaces for Indigenous applicants while holding no regional allocation policy. In this instance, we denoted the two spaces as specially allocated and subtracted them from the total number spaces available to applicants from regions across Canada. Special allocations that were explicitly denoted as “additional” were also subtracted from the total number spaces available to applicants from regions across Canada. Any spaces denoted as supernumerary to the institution’s normal quota of spaces were not included in our calculations.

Lastly, McMaster University (ON) does not articulate a policy that reserves a particular number of spaces to applicants from any province or territory, but it does have an explicit policy of reserving 90% of its pre-admission interview spots to applicants from ON. For this school, regional allocations were determined by calculating the potential number of interviews that may be offered to non-ON residents ($550 \text{ interviews} \times 10\% = 55 \text{ interview spots}$) and subtracting this number from the institution’s total number of medical school spaces ($203 \text{ medical school spaces} - 55 \text{ applicants} = \text{regional allocation of } 148 \text{ applicants from ON}$).

Once the data were assembled, the potential number of spaces for an applicant from each province and territory was determined by summing the relevant region’s specifically allocated spaces with the total number of unallocated spaces. A medical school space was deemed as “unallocated” when it *could* potentially be filled by any Canadian applicant, including applicants already considered by a contemporaneous regional allocation policy.

We also collated data pertaining to the number of applications for medical school spaces by province or territory, the relevant population of the province or territory, the eventual enrolment by province or territory for the 2018/2019 academic year and the physician-to-population ratios for each region.

The data on application pressure by province were calculated by summing the number of applications submitted by men and women from each province or territory as presented in the 2018 AFMC CMES report’s table of *Acceptances by Province or Country of Residence*

of Applicants and Sex (Table F-14; page 93; AFMC 2019). The number of first-year students that were enrolled into Canadian medical schools as a function of province or territory of application was extracted from the AFMC CMES 2018 report (Table A-4; page 16; AFMC 2019). The data pertaining to relevant regional populations were extracted from the 2017 Statistics Canada (2020) reports for population of individuals between the ages of 20 and 29 years, a window that represents the most likely cohort of medical school applicants (Young et al. 2012). The 2018 AFMC CMES report lists application pressure and enrolment numbers for the Yukon, Northwest Territories (NWT), and Nunavut (NVT) in aggregate. Data for the territories are accordingly also combined here. To facilitate comparison with the application and enrolment numbers, the total available seats for the territories included seats available to any territory, even if they were not available to each territory.

These statistics permitted us to determine the relative number of spaces, applications and enrolments per relevant (i.e., persons aged 20–29 years) 100,000 population. They also allowed us to determine the expected applications and enrolments per 100,000 population, given assumptions of equal interest in medical school and equitable regional admission to medical school, respectively, by province and territory. These values were achieved by multiplying the total number of applications or enrolments by 100,000 and dividing that number by the total Canadian population between the ages of 20 and 29 years. In calculating these expected application and enrolment values, we were presented with an opportunity to further extrapolate the impact of the regional allocation policies on applicants from across Canada.

We also extracted the number of physicians per 100,000 population for each region from Canadian Institute for Health Information's *Physicians in Canada, 2017* report (CIHI 2019: 42). We present these physician-to-population numbers in order to investigate whether more medical school opportunities are being presented to those provinces with the lowest number of physicians. Notably, CIHI excluded the NWT and NVT from their calculations due to small numbers; accordingly, we do not present this comparison for the territories.

Research ethics approval was not required, as all data are publicly available.

Results

In 2018, 1,928 (67.4%) of Canada's 2,860 medical school spaces were specifically reserved for applicants from particular provinces and territories, with each of the provinces and territories realizing different proportions of these allocations. There were 76 special allocations (2.7%) that needed to be accounted for outside of the regional allocations. The remaining 856 (29.9%) medical school spaces in Canada were potentially accessible by applicants from any province or territory (Table 1, available online at longwoods.com/content/26429).

Consideration of the allocated and unallocated medical school spaces in aggregate reveals that applicants from each of the provinces and territories were afforded a differential number of potentially available spaces. Applicants from Quebec (PQ) were afforded the greatest number of potential spaces (1,693), while those from the territories, combined, were afforded the fewest (912). NFLD was the province from which applicants had the fewest number of

potential spaces (963). When considering the number of available spaces with regard to the size of the population in each province, applicants from PEI were afforded the most spaces relative to the relevant 100,000 population (5,468.8), and applicants from ON were afforded the fewest (54.3; Table 2).

TABLE 2. Total available medical school spaces by province and territory in the 2018 admissions cycle

Region	Allocated spaces	Unallocated spaces	Total available spaces	Population (20–29 years)	Spaces per 100,000 population (20–29 years)
NFLD	107	856	963	59,036	1,631.2
NS	145	856	1,001	119,397	838.4
NB	161	856	1,017	86,003	1,182.5
PEI	149	856	1,005	18,377	5,468.8
PQ	837	856	1,693	1,046,698	161.7
ON	203	856	1,059	1,948,658	54.3
MB	160	856	1,016	190,325	533.8
SK	145	856	1,001	159,268	628.5
AB	326	856	1,182	605,154	195.3
BC	314	856	1,170	663,336	176.4
Territories	56	856	912	18,811	4,848.2
Total				4,915,063	

Review of the 2017/2018 application statistics by province and territory indicated that 13,540 Canadians applied to medical school in 2018. Of these, individuals from ON made the most applications (4,651), and individuals from the territories made the fewest (31). The highest number of applications per relevant 100,000 population was realized for QC (425.2), and the lowest number was realized for the territories (164.8). Assuming that interest in medical school is equal across provinces and territories, it is expected that each region would produce approximately 275.5 applications per relevant 100,000 population. A review of Table 3 highlights that NFLD, NB and PQ exceeded this expected application pressure, while all other provinces and the territories fell short of this benchmark.

Review of the enrolment metrics by province and territory revealed that 2,859 students enrolled in medical school in 2018. Applicants from ON secured the most medical school spaces in Canada (916), and applicants from the Territories secured the fewest (eight). The province securing the fewest medical school spaces in 2017/2018 was PEI (11). NFLD had the highest enrolment per relevant 100,000 population (115.2), and the NWT had the lowest enrolment (42.5) per relevant 100,000 population. The province with the lowest enrolment per relevant 100,000 population was ON (47.0). Assuming a system of equitable regional admissions, it is expected that each province and territory would account for 58.2 enrolments per relevant 100,000 population. A review of Table 3 highlights that NFLD,

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TABLE 3. Medical applications and enrolments in the 2018 admissions cycle

Region	Applications	Applications per 100,000 population (20–29 years)	Enrolment	Enrolment per 100,000 population (20–29 years)
NFLD	215	364.2	68	115.2
NS	278	232.8	89	74.5
NB	248	288.4	84	97.7
PEI	40	217.7	11	59.9
PQ	4,451	425.2	846	80.8
ON	4,651	238.7	916	47.0
MB	447	234.9	113	59.4
SK	273	171.4	85	53.4
AB	1,312	216.8	316	52.2
BC	1,594	240.3	323	48.7
Territories	31	164.8	8	42.5
Total	13,540		2,859	

NS, NB, PEI, QC and Manitoba (MN) exceeded this number of enrolments, while all other provinces and the territories fell short of this benchmark.

Table 4 presents the number of physicians per 100,000 population (CIHI 2019) alongside the total number of available medical spaces for each province. This table shows that PEI had the lowest number of physicians per 100,000 population (189.2) and the highest number of available medical school spaces per relevant 100,000 population (5,368.8); NS had the highest number of physicians per 100,000 population (256.5). However, the total number of available spaces per relevant 100,000 population in NS is intermediate with respect to the other provinces (838.4). Considering these relationships across all provinces, the table highlights that regional allocation policies across Canada are not determined solely as a function of the size of the physician workforce in each province.

Discussion

This descriptive policy analysis shows that availability of medical school spaces in Canada differs as a function of the province or territory from which applicants apply. At its most extreme, this difference amounts to 781 medical school opportunities – more than a quarter of all eventual enrolments – that are available to applicants from QC but are not available to applicants from the territories. Determining whether this differential is justified requires appraisal of the consequences of the policies with respect to their goals.

To begin, it is clear that a higher number of potential available spaces within a population is insufficient to ensure enrolment for certain regions. For instance, the territories (4,848.2) and PEI (5,468.8) are afforded considerably more potential spaces per 100,000 population between the ages of 20 and 29 years than any of the other regions. Despite this, enrolment from the territories is much lower than would be expected, given equitable processes of regional admissions; enrolments from PEI are roughly at the expected number.

TABLE 4. The number of physicians per 100,000 population and the total number of available medical school spaces by relevant (aged 20–29 years) 100,000 population by province

Province	Physicians per 100,000 population	Spaces per 100,000 population (20–29 years)
NFLD	255.3	1,631.2
NS	256.5	838.4
NB	236.2	1,182.5
PEI	189.2	5,468.8
PQ	247.7	161.7
ON	223.9	54.3
MB	210.3	533.8
SK	201.4	628.5
AB	247.3	195.3
BC	243.4	176.4

On the other hand, QC is afforded a number of spaces per relevant 100,000 population (161.7) that registers toward the lower end of the overall tally and yet secures a relatively large proportion of enrolments. This implies that the simple opportunity to compete for spaces does not do enough to enhance regional enrolment. Indeed, the application pressure from the territories and PEI is relatively low, as it is for many provinces that see fewer applicants enrol in medical school. This suggests that increasing medical school representation from certain regions likely requires greater policy intervention than simply granting potential access. In particular, policies should focus on increasing the number and competitiveness of applicants from the intended regions. This position is substantiated by evidence that early identification of potential physicians from underrepresented groups can be successful in increasing the number of qualified applicants when those students are provided with relevant learning opportunities and mentorship (Kosoko-Lasaki et al. 2006; Salto et al. 2014).

Although the data point to the importance of policy that increases the number of qualified individuals who apply to medical school, it is also clear that the specific and unshared allocation of spaces for a particular region is an important driver of increased regional enrolment. That is, the data highlight that the medical schools that explicitly reserve spaces for residents of the province in which the institution is located are able to enrol higher numbers of applicants from that province. This bears out for applicants from NFLD, NS and QC. Furthermore, admissions via these allocations reflect the vast majority of medical school enrolments from QC (98.9%) and British Columbia (BC; 97.2%). In this regard, the data suggest these policies are successful in meeting the objective of ensuring that education resources are being dedicated to the populations that reside there. However, they also suggest that applicants from these provinces are either not applying or are not successful in obtaining admission via the portion of spaces not allocated to particular regions.

These policies of regional allocation of medical school spaces may also discourage the enrolment of applicants from certain regions. In particular, the enrolment statistics show

that the allocations may work to offset the number of spaces attained by Ontarians. Consider this: ON applicants are afforded 203 regionally allocated spaces. All things being equal, the expectation would be that Ontarians would secure a proportion of the 856 unallocated spaces that equals their proportion of the application pressure (34.4%). However, the data presented here indicate that Ontarians secured 916 of 2,018 enrolments, 713 of which would be unallocated. This means that these applicants were successful in securing 83.2% of the total unallocated spaces. This distribution raises questions about the way in which Ontarians command such a large proportion of the enrolment even though they have among the fewest number of spaces available to them. One possibility is that the applicants from ON are judged to be of better quality than their counterparts from the rest of Canada, whether in a wholly valid sense or because the typical admissions metrics provide a better frame for these individuals. If this is the case, then the regional allocation policies may be working to reconcile some structural inequity in pre-medical school education and/or opportunity that favours ON applicants. Another possibility is that the ON medical schools are preferentially favouring ON applicants in the absence of any explicit policies. If this were the case, then these institutions may consider formalizing and making their selection processes pertaining to regional allocation transparent. This would allow applicants across the country to be judicious with regard to the way they apportion their own personal resources to the application process.

In considering these data, it is important to acknowledge that although the seat allocation numbers remain relatively static year-over-year, our interpretations of policy impacts with respect to application pressure and enrolments is limited: the values analyzed here are specific to the 2018 admissions cycle and are not necessarily representative of annual trends. Nevertheless, the demonstrated inequity in opportunity highlights the need for deeper study into whether current regional admissions policies are indeed serving the health human resources goals of medical education in Canada. For instance, medical school regional allocation policies that create inequity in opportunities might be warranted by strong evidence that the selection of students from particular regions indeed leads to a better distribution of physicians within those regions (Ellaway et al. 2018). In this regard, while the Northern Ontario School of Medicine success in rural contexts is encouraging (Strasser et al. 2009), the overall evidence base in support of this proposition remains small, with the most recent literature in the area (Goodfellow et al. 2016; Hughes et al. 2005; O'Connell et al. 2018; Puddey et al. 2017; Rabinowitz et al. 2000; Wayne et al. 2010) relying heavily on a single study that showed an association between physician gender, race, and socio-economic background and the likelihood of their serving low-income and racial minority populations (Cantor et al. 1996). Moreover, there is no compelling evidence that training *within* particular regions alters any future attachment that learners feel toward their place of origin. Given that this is a foundational assumption of policies designed to maintain physician supply by educating medical students in their home region, provinces and territories may find that fostering the overall competitiveness of their residents' applications to medical school and

advocating for their equitable opportunity to enrol into any Canadian medical school is a fairer and potentially more effective way of shaping their physician workforce.

Given the underdevelopment of evidence showing that the location of undergraduate medical training influences physicians' decisions regarding where and how to practise, we submit that policy makers wishing to increase the physician supply in a given area should focus on policy interventions within the training trajectory and the early years of independent practice (Lee et al. 2016; Myhre and Hohman 2012; Playford et al. 2017; Strasser et al. 2010; Walker et al. 2012). This may include the creation of additional postgraduate training spots, pipeline programs to support high-quality applicants from underserved communities or incentives for new graduates to establish practices in particular regions (Rourke et al. 2018; Young et al. 2017). We also suggest that access be considered as a function of not just geography but also language, culture, race and ethnicity. Improving access to groups currently underrepresented in medicine may necessitate the revision of geographical policies in favour of other affirmative admissions strategies (Saha et al. 2000).

Conclusion

There is an inequity in the opportunity to obtain medical school enrolment in Canada as a function of the province or territory of origin of the applicant. This highlights the need for deeper study into whether current regional admissions policies are indeed serving the health human resources goals of medical education in Canada. This will undoubtedly require more explicit articulations of the intended goals of admissions policies. Health human resource research should work to demonstrate the relationship between current admissions policies and the amelioration of regional physician shortages or identify other strategies to increase the regional physician workforce.

Correspondence may be directed to: Lawrence Grierson, associate professor, Department of Family Medicine, McMaster Program for Education Research, Innovation & Theory (MERIT), McMaster University, 100 Main St. W., Suite 5003/B, Hamilton, ON, L8P 1H6; e-mail: griersle@mcmaster.ca.

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References

- Association of Faculties of Medicine of Canada (AFMC). 2018. Canadian Medical Education Statistics 2017: Volume 39. Authors.
- Association of Faculties of Medicine of Canada (AFMC). 2019. Canadian Medical Education Statistics 2018: Volume 40. Authors.

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- Birch, S. 2002. Health Human Resource Planning for the New Millennium: Inputs in the Production of Health, Illness, and Recovery in Populations. *Canadian Journal of Nursing Research* 33(4): 109–14.
- Boelen, C. 2011. Consensus mondial sur la responsabilité sociale des facultés de médecine [Global Consensus on Social Accountability of Medical Schools]. *Santé Publique* 23(3): 247–60.
- Canadian Institute for Health Information (CIHI). 2019, February. *Summary Report: Physicians in Canada, 2017*. Retrieved December 21, 2020. <https://secure.cihi.ca/free_products/Physicians_in_Canada_2017.pdf>.
- Cantor, J.C., E.L. Miles, L.C. Baker and D.C. Barker. 1996. Physician Service to the Underserved: Implications for Affirmative Action in Medical Education. *Inquiry* 33(2): 167–80.
- Chapman, C.H. and R. Jagsi. 2017. The Ethical Imperative and Evidence-Based Strategies to Ensure Equity and Diversity in Radiation Oncology. *International Journal of Radiation Oncology, Biology, Physics* 99(2): 269–74. doi:10.1016/j.ijrobp.2017.04.015.
- Committee on Accreditation of Canadian Medical Schools (CACMS). 2019, February. CACMS Standards and Elements: Standards for Accreditation of Medical Education Programs Leading to the MD Degree.. Retrieved December 21, 2020. <https://cacms-cafmc.ca/sites/default/files/documents/CACMS_Standards_and_Elements_AY_2020-2021.pdf>.
- Dahl, M.S. and O. Sorenson. 2010. The Social Attachment to Place. *Social Forces* 89(2): 633–58. doi:10.2307/40984550.
- De Freitas, C., L. Grierson and M. Vanstone. 2019. When I Say... Merit. *Medical Education* 53(9): 858–60. doi:10.1111/medu.13894.
- Ellaway, R.H., R. Mahli, S. Bajaj, I. Walker and D. Myhre. 2018. A Critical Scoping Review of the Connections between Social Mission and Medical School Admissions: BEME Guide No. 47. *Medical Teacher* 40(3):219–26. doi:10.1080/0142159X.2017.1406662.
- Goodfellow, A., J.G. Ulloa, P.T. Dowling, E. Talamantes, S. Chheda, C. Bone et al. 2016. Predictors of Primary Care Physician Practice Location in Underserved Urban and Rural Areas in the United States: A Systematic Literature Review. *Academic Medicine* 91(9): 1313–21. doi:10.1097/ACM.0000000000001203.
- Government of Nova Scotia. 2019, August 8. Sixteen New Seats at Dalhousie Medical School. [press release]. Retrieved December 21, 2020. <<https://novascotia.ca/news/release/?id=20190808001>>.
- Hanson, M.D., G. Moineau, K.M. Kulasegaram and R. Hammond. 2016. Is Canada Ready for Nationwide Collaboration on Medical School Admissions Practices and Policies? *Academic Medicine* 91(11): 1501–08. doi:10.1097/ACM.0000000000001286.
- Herbert, R. 2007. Canada's Health Care Challenge: Recognizing and Addressing the Health Needs of Rural Canadians. *Lethbridge Undergraduate Research Journal* 2(1).
- Hill, S. 2016, July 11. Medical Program at University of Windsor Combats Doctor Shortage. *Windsor Star*. Retrieved December 21, 2020. <<https://windsorstar.com/news/local-news/medical-program-at-university-of-windsor-combats-doctor-shortage>>.
- Hughes, S., J. Zweifler, S. Schafer, M.A. Smith, S. Athwal and H.J. Blossom. 2005. High School Census Tract Information Predicts Practice in Rural and Minority Communities. *The Journal of Rural Health* 21(3): 228–32. doi:10.1111/j.1748-0361.2005.tb00087.x.
- Institute of Medicine of the National Academies. 2005. *Quality through Collaboration: The Future of Rural Health*. The National Academies Press.
- Kosoko-Lasaki, O., R.E. Sonnino and M.L. Voytko. 2006. Mentoring for Women and Underrepresented Minority Faculty and Students: Experience at Two Institutions of Higher Education. *Journal of the National Medical Association* 98(9): 1449–59.
- Lee, J., A. Walus, R. Billing and L. M. Hillier. 2016. The Role of Distributed Education in Recruitment and Retention of Family Physicians. *Postgraduate Medical Journal* 92(1090): 436–40. doi:10.1136/postgradmedj-2015-133577.
- Memorial University. 2019. Seat Allocation & Competition Pools. Retrieved December 21, 2020. <<https://www.med.mun.ca/Admissions/ApplicationEvaluationCompetitions.aspx>>.

- Myhre, D. and S. Hohman. 2012. Going the Distance: Early Results of a Distributed Medical Education Initiative for Royal College Residencies in Canada. *Rural and Remote Health* 12(4): 2151.
- O'Connell, T.F., S.A. Ham, T.G. Hart, F.A. Curlin and J.D. Yoon. 2018. A National Longitudinal Survey of Medical Students' Intentions to Practice among the Underserved. *Academic Medicine* 93(1): 90–97. doi:10.1097/ACM.0000000000001816.
- Playford, D., H. Ngo, S. Gupta and I.B. Puddey. 2017. Opting for Rural Practice: The Influence of Medical Student Origin, Intention and Immersion Experience. *Medical Journal of Australia* 207(4): 154–58. doi:10.5694/mja16.01322.
- Puddey, I.B., D.E. Playford and A. Mercer. 2017. Impact of Medical Student Origins on the Likelihood of Ultimately Practicing in Areas of Low vs High Socio-Economic Status. *BMC Medical Education* 17(1): 1. doi:10.1186/s12909-016-0842-7.
- Rabinowitz, H.K., J.J. Diamond, J.J. Veloski and J.A. Gayle. 2000. The Impact of Multiple Predictors on Generalist Physicians' Care of Underserved Populations. *American Journal of Public Health* 90(8): 1225–58. doi:10.2105/ajph.90.8.1225.
- Razack, S., B. Hodges, Y. Steinert and M. Maguire. 2015. Seeking Inclusion in an Exclusive Process: Discourses of Medical School Student Selection. *Medical Education* 49(1): 36–47. doi:10.1111/medu.12547.
- Rourke, J., S. Asghari, O. Hurley, M. Ravalia, M. Jong, W. Parsons et al. 2018. From Pipelines to Pathways: The Memorial Experience in Educating Doctors for Rural Generalist Practice. *Rural and Remote Health* 18(1): 4427. doi:10.22605/RRH4427.
- Saha, S., S.H. Taggart, M. Komaromy and A.B. Bindman. 2000. Do Patients Choose Physicians of Their Own Race? *Health Affairs (Millwood)* 19(4): 76–83. doi:10.1377/hlthaff.19.4.76.
- Salto, L.M., M.L. Riggs, D.D. De Leon, C.A. Casiano and M. De Leon. 2014. Underrepresented Minority High School and College Students Report STEM-Pipeline Sustaining Gains after Participating in the Loma Linda University Summer Health Disparities Research Program. *PLoS One* 9(9): e108497. doi:10.1371/journal.pone.0108497.
- Siu, E. and H.I. Reiter. 2009. Overview: What's Worked and What Hasn't as a Guide towards Predictive Admissions Tool Development. *Advances in Health Sciences Education: Theory and Practice* 14(5): 759–75. doi:10.1007/s10459-009-9160-8.
- Statistics Canada. 2020. Population Estimates on July 1st, by Age and Sex: Table 17-10-0005-01. Retrieved December 21, 2020. <<https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1710000501>>.
- Strasser, R.P., J.H. Lanphear, W.G. McCready, M.H. Topps, D.D. Hunt and M.C. Matte. 2009. Canada's New Medical School: The Northern Ontario School of Medicine: Social Accountability through Distributed Community Engaged Learning. *Academic Medicine* 84(10): 1459–64. doi:10.1097/ACM.0b013e3181b6c5d7.
- Strasser, R., J.C. Hogenbirk, M. Lewenberg, M. Story and A. Kevat. 2010. Starting Rural, Staying Rural: How Can We Strengthen the Pathway from Rural Upbringing to Rural Practice? *Australian Journal of Rural Health* 18(6): 242–48. doi:10.1111/j.14401584.2010.01167.x.
- Walker, J.H., D.E. Dewitt, J.F. Pallant and C.E. Cunningham. 2012. Rural Origin Plus a Rural Clinical School Placement Is a Significant Predictor of Medical Students' Intentions to Practice Rurally: A Multi-University Study. *Rural and Remote Health* 12: 1908. doi:10.22605/RRH1908.
- Wayne, S.J., S. Kalishman, R.N. Jerabek, C. Timm and E. Cosgrove. 2010. Early Predictors of Physicians' Practice in Medically Underserved Communities: A 12-Year Follow-Up Study of University of New Mexico School of Medicine Graduates. *Academic Medicine* 85(10): S13–16. doi:10.1097/ACM.0b013e3181ed1bee.
- Young, M.E., S. Razack, M.D. Hanson, S. Slade, L. Varpio, K.L. Dore and D. McKnight. 2012. Calling for a Broader Conceptualization of Diversity: Surface and Deep Diversity in Four Canadian Medical Schools. *Academic Medicine* 87(11): 1501–10. doi:10.1097/ACM.0b013e31826daf74.
- Young, M.E., A. Thomas, L. Varpio, S.I. Razack, M.D. Hanson, S. Slade et al. 2017. Facilitating Admissions of Diverse Students: A Six-Point, Evidence-Informed Framework for Pipeline and Program Development. *Perspectives on Medical Education* 6(2): 82–90. doi:10.1007/s40037-017-0341-5.